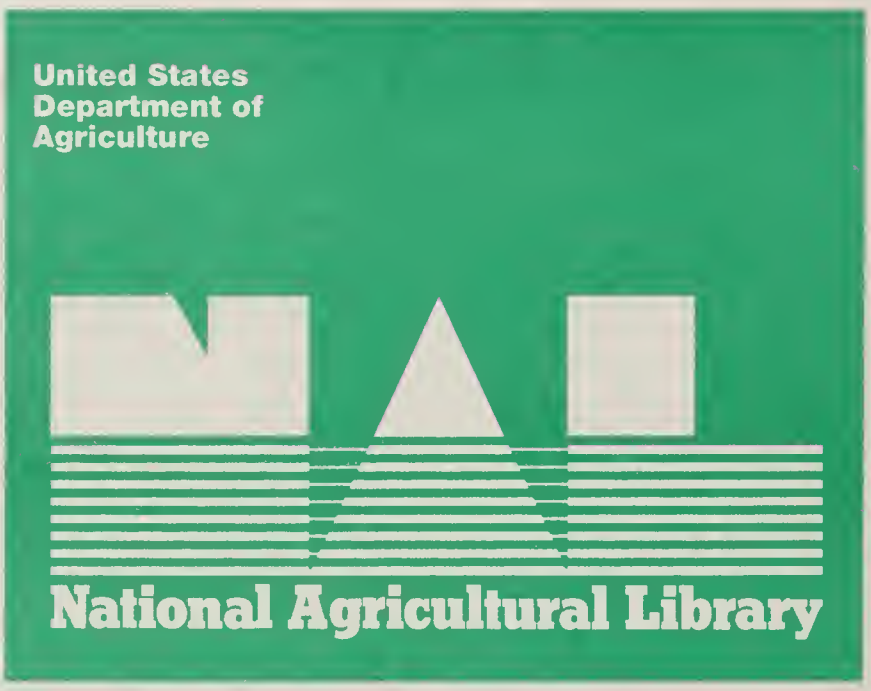
LORIST AND
URSERY CROPS
ABORATORY

esearch Programs and Personnel

U.S. Department of Agriculture
Agricultural Research Service
Plant Sciences Institute
Beltsville, Maryland

Society of American Florists
American Floral Endowment
U.S. Department of Agriculture



Laboratory Mission

To conduct a range of basic, applied, and developmental research involving problems of plant growth and flowering, genetic improvement, and the production and maintenance of pathogen- and pest-free plants. To (1) develop a new crops program of germplasm evaluation and introduction in cooperation with the Society of American Florists and the American Floral Endowment; (2) develop new genetic engineering technology to produce new types through chromosome transformation; (3) produce specific immunological reagents useful for detection of pathogens, as well as natural products such as plant hormones; (4) develop virus resistant transgenic plants; (5) develop tissue culture procedures of ovule rescue to produce new plant forms; (6) investigate the biology of sweetpotato whitefly; (7) develop new procedures for detection and control of virus diseases; (8) investigate new technology to control soilborne diseases using disease suppressive organisms as a non-chemical method of control; (9) investigate the use of a natural product for disease and insect control.

Historical Background

For more than 50 years, the Laboratory has made contributions in physiology, genetics, pathology and entomology. Research in physiology resulted in improved methods for control of flowering of bulb crops, and flowering pot plants and cut flowers. Research on photoperiod and light quality led to improved production practices for chrysanthemums as well as other floral and nursery crops. Research on new crops has contributed to the introduction of several new flowering pot plants.

Contributions in genetics and breeding have included the development of advanced germplasm of Poinsettia, Lily, Impatiens, Ornithogalum and other new crops.

The research on Impatiens stimulated the development of a major new crop that is now the number one selling bedding plant. A new dwarf Eustoma 'Little Belle Blue' was developed. These contributions to germplasm improvement have combined basic genetic studies with plant tissue culture.

Pathology research in the laboratory began with pioneering work on the nature and properties of virus diseases of florist and nursery crops more than 50 years ago. This research identified the casual viruses associated with diseases of lilies, roses, chrysanthemums, carnations, gladiolus and many other crops. The role of insects in the transmission of viruses in these crops was investigated and the spread of the insect transmitted viruses was described. More recently, technology has been applied in the development of methods for detection of plant viruses utilizing new serological test reagents. In addition, procedures utilizing methods to detect the viral nucleic acid have been developed.

Biological control of soilborne pathogenic fungi utilizing antagonistic microorganisms is an important approach to disease control as the use of synthetic pesticides is reduced. New methods of disease control utilizing natural products are also being investigated.

Entomology research has included studies on many economically important insects of florist and nursery crops. Understanding the biology of the insect and the interactions of the insect and host plant has led to the development of improved control procedures, chemical control and, more recently, through biological control.

Research Approaches

New research directions have been developed in the laboratory to meet both the long-term needs through basic research as well as the short-term requirements to solve applied problems of the industry. These directions include:

1. Development of a new crops program of germplasm evaluation and introduction in cooperation with the Society of American Florists and the American Floral Endowment.

2. Development of genetic engineering technology to produce new plant types through chromosome transformation.

3. Production of specific immunological reagents useful for detection of pathogens as well as natural products such as plant hormones.

4. Development of new tissue culture procedures of ovule rescue to produce new plant forms.

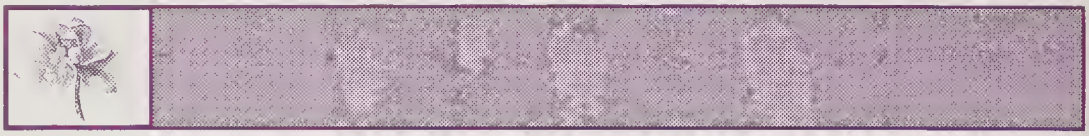
5. Investigation of the biology of the sweetpotato white fly and development of new methods of control.

6. Development of new procedures for detection and control of virus diseases.

7. Investigation of new technology to control soilborne diseases using disease suppressive organisms as a non-chemical method of control.

8. Investigation of the biochemical basis for color expression as a basis for developing new and im proved flower color and for cultivar identification.

This booklet contains a listing of the scientific and support staff and a description of the current research program. Selected research contributions are also identified.



Roger H. Lawson

Research Leader

Rm. 208, B-004, BARC-West
(301) 504-6570

Conducts research on virus, bacterial, and mycoplasma diseases of florist and nursery crops. Investigates host-virus interactions at the subcellular level by light and electron microscopy. Investigates improved methods of disease diagnosis and production of pathogen-free stock. Collects and evaluates new floral germplasm for crop introduction.

Robert J. Griesbach

Research Geneticist

Rm. 208, B-004, BARC-West
(301) 504-6574

Conducts research on the expression of foreign genes in transgenic plants. Develops methods for introducing new genetic material into recalcitrant ornamental plants and biochemical mechanisms associated with flower color.

John Hammond

Research Plant Pathologist

Rm. 208, B-004, BARC-West
(301) 504-5313

Conducts research on virus diseases of ornamental crops, including study of the mechanisms of resistance to virus infection and replication in transgenic plants, and introduction of such resistance into ornamentals. Develops methods of virus detection and strain differentiation by serology and nucleic acid hybridization.

Hei-ti Hsu

Microbiologist

Rm. 208, B-004, BARC-West
(301) 504-5657

Develops methods of eliciting specific immune response for production of polyclonal antisera and monoclonal antibodies and develops sensitive techniques for rapid and reliable identification of plant pathogens. Conducts research on virus-vector-host plant interaction. Investigates vector cell culture system for studies of plant viruses.

Ramon L. Jordan

Research Plant Pathologist

Rm. 208, B-004, BARC-West
(301) 504-5646

Conducts research on the biochemical and immunological nature of plant viruses, their genomes and gene products. Develops monoclonal antibodies to study antigenic structures and for improved viral detection and identification. Develops methods to confer virus resistance through expression of antibody proteins, and replicase-binding

Kathryn K. Kamo

Plant Physiologist

Rm. 208, B-004, BARC-West
(301) 504-5350

Identifies biochemical events associated with cell division and differentiation. Studies cell, tissue and organ development and correlates biochemical changes with morphological changes leading to formation of the whole plant. Applies information to creating transgenic plants.

James C. Locke

Research Plant Pathologist

Rm. 208, B-004, BARC-West
(301) 504-6413

Conducts research on fungal and bacterial diseases of ornamental crops. Emphasis is currently on non-pesticidal approaches to control soilborne and foliar fungal pathogens utilizing biocontrol agents and natural plant products. Also responsible for disease and insect evaluation tests to support the 'minor use' pesticide registration program (IR-4) for ornamentals.

John W. Neal, Jr.

Research Entomologist

Rm. 8, B-470, BARC-East
(301) 504-9159

Develops alternative methods of management and control of insect and mite pests of flowering and foliage plants. Research is conducted on the biology and behavior with emphasis on the pest's development biology, ethology, reproductive biology, host-plant interactions, and mechanisms of biological control. Approaches to control utilize biocontrol agents and natural plant products.

Mark S. Roh

Research Horticulturist

Rm. 208, B-004, BARC-West
(301) 504-5659

Conducts research on physiological factors that influence growth and flowering of new crops. These investigations will provide information essential for commercial development of these crops. Significant contributions include developing procedures for controlled flowering in Clematis, Lilium, Ornithogalum and Lachenalia.

David B. Rubino

Research Geneticist

Rm. 208, B-004, BARC-West
(301) 504-5469

Conducts research on the genetic control of economic traits in florist and nursery crops and develops improved methods for genetic enhancement. Investigates hybridization of diverse genotypes and develops tissue culture and molecular marker systems to facilitate the selection and study of qualitative and quantitative characters.

Leslie M. Palmer

Research Molecular Biologist

Rm. 208, B-004, BARC-West
(301) 504-5646

Conducts research to develop induced virus resistance through expression of viral-specific monoclonal antibody proteins in transgenic plants. Studies include using recombinant DNA and polymerase chain reaction technologies in the cloning and expression of antibody genes in bacteria and plants. Examines the genome structure of new viruses affecting ornamentals.

Margaret Brannigan

Plant Pathologist

Rm. 208, B-004, BARC-West
(301) 504-7244

Investigates cytology of viral, bacterial, mycoplasma and nutritionally induced plant diseases using light and electron microscopy. Studies pathogen relationships and host infection processes to develop improved methods of disease diagnosis and control. Incorporates new technology to digitize, analyze and process microscopic images.

Office Staff
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